

Lilly

A F T E R N O O N S E S S I O N

1:42 p.m.

A R N Y S C L I F T O N L I L L Y, J R.,
resumed, having been previously duly sworn, was
examined and testified further as follows:

THE VIDEO OPERATOR: We are back on
the record at 1:42:15.

CONTINUED EXAMINATION

BY MR. PAYTON:

01:42:24 11 Q. Dr. Lilly, through the 1970s, through
12 that period, started back in '73 on the tobacco
13 side and you were there through the seventies,
14 was Dr. Dunn one of the principal scientists
15 throughout the period of the seventies?

16 A. My recollection is, yes, he was ^a~~the~~
17 principal scientist in the seventies.

01:42:46 18 Q. Do you know when he left the company?

19 A. I believe, memory again, that he left
20 the company in '88 or '89. I may be wrong there,
21 but, you know, sometime toward the end of the
22 eighties, if not into the nineties. But I seem
23 to remember more the late 1980s.

01:43:14 24 Q. And in this period I'm talking about,
25 which is just the seventies right now --

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A. Yes, sir.

01:43:20 Q. -- he was one of the principal
scientists. Was he held in high regard by the
people at the research center?

A. That's kind of difficult for me to
answer. I viewed Bill as an amiable guy and a
reputable scientist. I will give you my own
answer to that.

01:43:42 Q. All right. What was the opinion you
had?

A. It was not my field, obviously. I
don't know how he was viewed. *In general*
~~generally~~ the
principal scientist position was viewed as a high
technical position in the laboratory.

01:44:06 Q. Did he play a role in you becoming an
associate principal scientist?

A. I must assume that he did, since, now
that I understand what happens in that role, he
had a vote on my becoming that.

01:44:24 Q. Do you know if he played a role in
you becoming one of the principal scientists?

A. Again, I must, from what I know now,
assume that he did, because he would have had one
of the votes for me going from associate

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2 principal to principal, yes, sir.

01:44:50 3 Q. In the seventies again, just in that
4 period, are you aware of any view that management
5 at Philip Morris had of Dr. Dunn?

6 A. I'm really not, no.

01:45:10 7 Q. Are you aware of any criticism of Dr.
8 Dunn during the seventies?

9 A. I'd have to answer the same way
10 there. I'm just not -- no one ever spoke to me
11 about anything.

01:45:24 12 Q. I asked you a few questions before
13 lunch about some reports that related to various
14 studies, a couple of studies relating to
15 nicotine.

16 A. Yes, sir, these.

01:45:38 17 Q. Yes. And you didn't recall, I don't
18 believe, two of those. One you had some input
19 and you remembered your role in that.

20 A. I remembered my role on one of them.
21 The other one I could not remember why I would
22 have been part of it, actually.

01:45:50 23 Q. Do you remember in this same time
24 frame, 1973, '74, around there, working on any
25 projects that related to nicotine delivery?

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1
2 A. The only ones that I -- I
3 concentrated on trying to understand flow,
4 combustion, pyrolysis and filtration, and in that
5 regard I think we've discussed, you know, what
6 came out of that type of report, about what phase
7 nicotine might have been in compared to tar.

01:46:26 8 Q. So in that context, you would have
9 worked on --

10 A. In that context, I would have worked
11 on it. I don't recall me working in any other
12 context, or whether someone would ask me to make
13 a calculation. That's possible. I don't
14 remember.

01:46:46 15 Q. And would that have been part of your
16 effort to come up with sort of a model of the
17 physical properties of the combustion and
18 ventilation and puff of a cigarette?

19 MR. MURPHY: I object to the form of
20 the question. You can answer.

21 A. I think part of what we attempted to
22 do in that group was to come up with some
23 understanding of what went on, and in that
24 regard, yes, we wrote down some equations and
25 tried to solve them. It was driven largely by

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trying to create an understanding, rather than explicitly saying, well, this piece of work is going to lead to a new product.

So it wasn't really basic, if you understand basic, because it was really still applied, but it was basic in the regard that we were trying to look at a cigarette not empirically, you know, as much as we could.

01:47:54 Q. And I think there was a reference in one of the documents to the physical tobacco project. Do I have the right -- physical tobacco.

MR. MURPHY: Tobacco physics?

MR. PAYTON: Yes.

A. I thought of that. Tobacco physics rings a bell with me, yes.

01:48:08 Q. That would have been the description of all of these?

A. That would have been the description of the project, and during the project there would be some study of parameters, very wide, about what happened. And as we discussed earlier, even the -- pardon -- catalysis work would have been part of that project.

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2 MR. MURPHY: Just to be clear, John,
3 by the project did you mean 1706, that had been
4 the subject of the prior testimony, identified as
5 the tobacco physics project in Exhibit --

6 MR. PAYTON: Yes, I was referring to
7 only the reference in one of these exhibits, the
8 exhibit that references on page 9.

9 A. That's the reference -- that's what I
10 was referring to, also.

01:49:08 11 Q. Yes, the tobacco physics project on
12 page 9 is referenced, and this is Lilly
13 Exhibit -- what number exhibit is that?

14 MR. MURPHY: Exhibit 3.

15 MR. PAYTON: Yes, 3.

01:49:18 16 Q. I was simply referring to the tobacco
17 physics project that is referenced in here, which
18 is identified with you in the report. Do you see
19 that, Dr. Lilly?

20 A. I see that.

01:49:30 21 Q. And is this what you were referring
22 to as 1706?

23 A. I'm referring to the charge number,
24 like 1600 on the front of this. If I recall, the
25 charge number for tobacco physics was 1706.

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(Lilly Exhibit 5 for
identification, inter-office memorandum from W.L.
Dunn to H. Wakeham, dated January 21, 1974.)

01:50:08 Q. I think there was a reference on one
of these annual reports to a C. Levy, Carolyn
Levy. She is the author of the July 9, 1976
annual report on behavioral research annual
report. Do you see that?

MR. MURPHY: I object to the form. I
don't think you mean to misspeak, John, but I
think she is identified as one of three authors.

MR. PAYTON: Yes, she is one of
three.

A. I read Frank Ryan, Carolyn Levy, and
B. Jones.

01:50:44 Q. Do you know Carolyn Levy?

A. Yes, sir, I know Carolyn.

01:50:50 Q. What was her expertise?

A. As I remember it, Carolyn had a Ph.D.
in psychology, and I don't remember whether I can
put experimental on it or just psychology. She
did obtain a Ph.D. in psychology.

01:51:12 Q. Did she at some point leave R&D?

A. As I remember, Carolyn left R&D

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twice. She left R&D, if I remember the first time, to go into a position in New York that I'd like to be able to tell you what it was but I don't remember.

Q. Was it marketing?

A. It was, I think, surrounded somewhat or dealing with marketing, or marketing research. She came back and became the manager of product evaluation division, which was one of the R&D divisions under the new products group. And then she left R&D again, and I believe she did become the director or assistant director of market research in New York.

Q. Do you know what she is doing now?

A. Yes, I do know. She went from market research into the planning, business planning department, as the director of planning, and in that regard I dealt with her somewhat because I had the responsibility for planning and R&D at that time. She became the vice president of planning. And she was recently promoted to senior vice president -- I'm struggling for the exact name so I can tell you the exact name. It's a between marketing and sales -- I mean,

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it's a more broad planning, market research role. And, I'm sorry, I don't remember the exact name of that. But this happened maybe a few months ago.

Q. Would you take what has been marked in front of you as Lilly Exhibit 5, a three-page document, a memo from Mr. Dunn to Mr. Wakeham, dated January 21, 1974. It has production number PA 828691 through PA 828693, or 1000731165 through 1167. This is a Philip Morris inter-office memorandum.

Would you take a look at this and --

A. Can I just scan through it?

Q. I am going to direct you to something. But, yes take a look at it. But if you look at the second page, you will see on the second page there is a reference to you and your work, in the second full paragraph. So take a look at the memo, and then you will see on the second page there is a reference to you, and I am going to ask you about both.

A. I'm reading the recommendation to me right now, or the recommendation about me.

I finished the reference to me. Can

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I just scan the rest of it?

Q. Yes.

A. At least I scanned it. Sorry for the time.

Q. The subject of the memo is the request for cigarettes by the Tobacco and Health Institute of the University of Kentucky. Are you familiar with that institution, then or now?

A. Yes, I'm interested -- I'm familiar with the University of Kentucky, and in context to R&D, that they supply reference cigarettes, I remember 2R1, for example, and I remember 1R4F.

Q. What are those?

A. Those are cigarettes that are essentially reference cigarettes, at one a very high tar level, and at the other something like 11 milligrams, that are used as control cigarettes for testing, of chemistry, for instance, coming out the end of the cigarette.

Q. Both those references that you just made, are those to standard cigarettes that would be produced for the purposes of an experiment or a study?

A. Well, I'm not a great expert here,

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but I understand that those cigarettes are made up and managed to the University of Kentucky so that people doing experiments where they want a control can have a supply of a standard cigarette so their work at least can be brought back to the same control.

Q. Did you understand that sometimes those cigarettes were supplied by Philip Morris or other tobacco companies?

A. I have heard, and this is only through someone maybe, or maybe I heard a talk, that they spread or rotate who makes those cigarettes. Yes.

Q. And having skimmed this memo, do you have any present recollection of this request for cigarettes by the University of Kentucky's Tobacco and Health Institute?

A. No, sir. I did find it interesting,, I was mentioned here and I wasn't copied. But, no, I don't. This is the first time I've ever seen this memo.

Q. This memorandum does not show a copy to you. Do you remember if you nevertheless received the memo?

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A. I don't remember ever receiving this memo.

Q. Go to the second page.

A. Yes, sir.

Q. Do you see the handwriting there?

A. Yes, I do see the handwriting.

Q. Do you recognize the handwriting?

A. No, sir, I don't.

Q. Now let's go to the paragraph that has the reference to you, which is the second complete paragraph on that page. It starts with "I recommend that we not provide the cigarettes." Do you see that?

A. Yes, I see that.

Q. And then it goes down to the first reference to you, "Cliff Lilly's current work on delivery changes as a function of flow rate." I'm going to go through the whole thing, but I actually want to stop there and ask you what your then current work on delivery changes as a function of flow rate was. Or do you --

MR. MURPHY: I object to the form of the question, and I think it might be simpler if you read the entire paragraph, but I will let the

1 Lilly
2 witness answer the question, and we can read the
3 rest of the paragraph in.

4 MR. PAYTON: I will read the whole
5 paragraph into the record, so that the record is
6 complete, and then I'm going to go through it bit
7 by bit.

8 THE WITNESS: Okay.

01:59:30 9 Q. The sentence that I want to ask you
10 about is as follows: "Cliff Lilly's current work
11 on delivery changes as a function of flow rate is
12 raising doubts about the validity of the nicotine
13 butt residual index, and the same group's
14 findings on the high delivery of high dilution
15 cigarettes under certain conditions are two
16 examples of potential error source, and Griffith
17 intends to use the nicotine residual butt
18 analysis measure as one of his several critical
19 indices."

20 Now, I want to ask about what your
21 then current work on nicotine -- on delivery
22 changes as a function of flow rate.

23 MR. MURPHY: I object to the form of
24 the question. I think you misspoke, John. It
25 says delivery, and your question said nicotine

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delivery.

MR. PAYTON: I changed it.

MR. MURPHY: But I'm not sure the record as it is transcribed by the court reporter picks that change up.

MS. ROBBINS: Why don't you just read the question back?

MR. MURPHY: Perhaps you could restate the question.

02:00:30 Q. Do you remember what your then current work on delivery changes as a function of flow rate was?

A. I think I remember, and I think we've also talked about it. We were doing work on combustion flow, filtration, diffusion, those things to understand cigarettes. We had a machine that was hand-built, it wasn't an FTC machine or anything, where one could dial in the flow. If you wanted to take a puff at a hundred cc's per minute, you could, or if you wanted to take one at 5,000 cc's a minute, you also could.

02:01:12 Q. You had a name for this machine, the human --

A. We called it the multiple parameter

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2 smoking machine.

3 And so what I assume this memo is, or
4 what Dr. Dunn is talking about, is having heard
5 me give a talk sometime, or come up and see it, I
6 don't remember how, that it's simply what we
7 talked about before, that as you up the velocity
8 through a filter, its efficiency to remove
9 anything, tar, nicotine, water, anything,
10 actually goes down. And that would be what I
11 surmise is being talked about in that paragraph
12 that you just read.

02:02:08 13 Q. Do you recognize the term "delivery"
14 in there as describing what you have just said
15 you recall working on?

16 MR. MURPHY: I object to the form of
17 the question. You can answer.

18 A. What we do, of course, is we did
19 smoke cigarettes on the machine, and we would set
20 up a certain flow rate, one that we -- I mean,
21 for pulling something completely out of the air,
22 let me say 1500 cc's per minute. And we would
23 actually not smoke one, we would smoke four at a
24 time. And we would --

02:02:46 25 Q. On the machine? You would smoke them

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2 on the machine, you mean?

3 A. Those are on the machine, yes, sir.
4 So each time a puff was taken, and we did use the
5 protocol of doing it once per minute, that puff
6 would have a certain puff duration, and would
7 have a certain flow rate during the puff. In
8 other words, it would go up to here, and go that
9 far. And then if I doubled that, it would go to
10 here and go that far.

11 And each time we took a puff, we also
12 measured the position on the rod as a distance,
13 and what came out of that was delivery, which is
14 what we measured on a Cambridge filter pad behind
15 the machine, and that delivery we would weigh,
16 and so we would get a total number of milligrams,
17 and that was the extent of our analytical
18 ability. Anything else we would have to send to
19 the analytical lab and get.

02:03:52 20 Q. You would break it out into tar and
21 nicotine and moisture delivery?

22 A. That would be the reason for sending
23 it. We did a lot of work where we just weighed
24 it --

02:04:00 25 Q. And let somebody else do --

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2 A. No, we just said, look, what does TPM
3 do, and then in some cases we would send it down,
4 and back would come from analytical, water,
5 nicotine, and they left it to us to subtract and
6 get tar.

02:04:18 7 Q. I want to go to the next part of this
8 sentence, which refers to the validity of the
9 nicotine butt residual index. Do you know what
10 the nicotine butt residual index is?

11 A. Well, I know that I'm not an expert
12 with that, but I'll give you my criticism I think
13 I made at the time.

02:04:48 14 Q. Yes.

15 A. And I can't even give you full
16 details of who designed the experiment or how I
17 even heard of it.

02:04:56 18 Q. You are the expert in this room, I
19 can tell you that.

20 A. I may not even be in this room.
21 There was some attempt or some
22 experiment done to collect cigarette butts from
23 smokers. The reason I know that is I've had the
24 butts I had in an ashtray in the cafeteria taken
25 and put in a bag. And as I understand the

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premise of those experiments --

Q. This is science, right?

A. I prefer not to comment there, if I may.

Was to measure the nicotine on that filter, and then, by some sort of backward calculation, calculate how much delivery a person who smoked that cigarette would have gotten. And I believe, and I'm fuzzy here, that it was based on an FTC 1,050 cc per minute or 35 cc per puff analysis. And I believe, again, and this is my belief based on only memory, that it was to try to get some handle on what kind of deliveries people were getting, free and clear of wires hanging on them and recorders hanging on them, and this type of thing.

My criticism, I'll be happy to share with you that, was that we had just done a long series of the measurements that I previously described on the multiparameter smoking machine, in which we had measured the actual efficiencies of cigarettes for various things as a function of flow rate, since we had the capability to dial in flow rate, and had shown wide efficiency

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variations, depending on what the flow may be. For real low flows, I mean, the efficiency is up in the sky, and for flows that are higher than the 1050 FTC, the efficiency of the filter, as, you know, not unusual if you look at aerosol physics and filtration in general, like my furnace filter, that the ability to filter aerosol particles drops pretty rapidly with velocity.

And so as you begin to have a flow rate that was higher, then almost in an exponential fashion the efficiency comes down. And if you really go to extreme lengths, that virtually no consumer would be interested in anyway, but only to investigate a mechanism, somewhere out here it would begin to go up, and that's because you just don't follow the flow stream, you just crash into things, and you don't go around, called impaction.

I assume this is what Dr. Dunn was talking about, because I do remember my criticism of detecting what I smoked or anyone smoked, that one had to know what the person's flow rate was before they could go back to the filter and

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measure something and say "Yeah, that's how much delivery came about."

Q. I'm trying to come up with sort of an everyday description that would apply to a smoker that would reflect the term you are using, which is flow rate. Is that how hard someone would be puffing on the cigarette?

A. No, I think it's -- if we can focus on the FTC test for a second, a two-second puff is 35 cubic centimeters.

Q. On their machine?

A. On their machine. When carried to 60 seconds, or continuous flow rate, it would be a flow rate of 1,050 cc's per minute. And so when I talk about flow rate, I mean I'm really talking about a flow rate in cc's per minute. But one has to realize that two seconds of that flow rate are taken out and called a puff. But, nevertheless, the flow rate during the puff would be equivalent to 1050 or 1500 on our machine, wherever you would set it. And then this would establish the velocity of the smoke down the cigarette rod and through the filter.

Q. And so the velocity at which the

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2 smoker would inhale the puff of smoke, measured
3 as a 60-second number, is the flow rate?

4 A. For a smoker it would be the
5 velocity -- I mean, it would be the volume that
6 he took on that puff, made into a flow rate by
7 knowing the cross-sectional area in which the
8 flow was being taken through.

02:10:40 9 Q. Yes.

10 And am I right in saying that the
11 criticism you had of the nicotine butt residual
12 index was that it presumed a uniform flow rate,
13 actually the FTC machine's flow rate, for every
14 single --

15 A. As I remember the --

16 MR. MURPHY: I object to the form of
17 the question. You can answer the question.

18 THE WITNESS: I'm sorry, I talked
19 before you even objected.

20 A. As I remember the experiment, it did.

02:12:06 21 Q. The next part of the sentence, I'm
22 just going along here, it says, "and the same
23 group's findings on the high delivery of high
24 dilution cigarettes under certain conditions."
25 Do you see that?

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A. Yes.

Q. I take it the reference to the same group is a reference to your group?

MR. MURPHY: I object to the form of the question.

Q. Do you know?

MR. MURPHY: If you know, you can answer it.

A. I mean, just reading this, I assume that that's what he means, yes.

Q. Do you know what is being described when it refers to the same group's findings on the high delivery of high dilution cigarettes under certain conditions?

A. You notice I'm less sure of that one.

We looked at, of course, dilution or ventilation, also, and what I read from this, and I don't really remember discussions of this as much as I did the other one, that we were going through the same type of parameterization, and we would have done experiments that said, okay, here's a ventilated cigarette, and we're going to go with, you know, small puff volume all the way

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1 through to big puff volumes. And what that type
2 of experiment would do, intended for really
3 understanding a model of this thing, would
4 normally drive the volume through that cigarette
5 way over what it would be intended in actual
6 use. For instance, a 50 percent ventilated
7 cigarette might be expected to bypass 50 percent
8 of the flow in a puff through the filter, and
9 rather than getting 35 cc's, might have 17-1/2.
10

11 In an experiment where we were trying
12 to actually understand what was going on, and the
13 interactions, we may have put 90 cc's through
14 that cigarette, a sum of 3,000 cc's per minute,
15 you know, for a couple of seconds, or something
16 like that.

17 And I think it's quite - I mean,
18 there was no surprise to us that the delivery
19 went up as I put more volume through the
20 cigarette, because if I'm putting three times the
21 volume per puff through, it doesn't really matter
22 that half of it is going through the filter here,
23 I'm still having 45 cc's go through ~~an oxidized~~ *and oxidize*
24 carbon and release heat, and that's greater than
25 the FTC 35 cc's.

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That would be the only thing, the only way I could add any more than I remember. I mean, that's what I remember what we did.

02:15:16 Q. You said you were part of a study as a subject to determine something about puffs, and you walked around with a bunch of measuring devices on, I take it. Do you recall this?

MR. MURPHY: I object to the form of the question. The testimony speaks for itself. You can answer the question.

A. Yes, I did say that, and I do remember doing that.

02:15:40 Q. Did that result in a paper or a report on what actual smokers' puff history was? What was the point of that experiment?

MR. MURPHY: I object to the form; compound. You can answer the question, if you understand what you are being asked.

A. Number one, I don't remember whether that resulted in a peer reviewed paper or something. As I understood the experiment, there was -- and it reads kind of like this paragraph in a way -- that there was some research work going on to determine how cigarette smokers

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2 actually puffed on cigarettes, what was their
3 duration, interval and flow rate.

02:16:34 4 Q. And how that might change from smoker
5 to smoker?

6 A. I don't remember how many smokers
7 were part of that, or how many machines they
8 had. I do remember at least one occasion when I
9 wore the machine in my hip pocket and had a
10 ~~Bernoulli~~ tube holder where I put my cigarettes in
11 and smoked.

02:16:58 12 Q. Do you remember if you were asked to
13 smoke different types of cigarettes as part of
14 that experiment?

15 A. You know, I don't remember that. I
16 mean, I do remember that we had little bags that
17 we put the cigarette butts in. I don't
18 remember. I'm a Marlboro smoker, by the way. I
19 don't remember whether I was asked to smoke
20 others, I just don't. And I don't remember how
21 many times I did it. I certainly remember one,
22 maybe two times that I did that.

02:17:32 23 Q. The machine that was developed by
24 your team, that smoked cigarettes four at a
25 time --

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A. Yes, sir.

Q. -- did it have variability as far as the velocity of puffs it took? That is, could you change it?

MR. MURPHY: I object to the form. You can answer, if you understand the question.

A. I think I understand the question. And as I remember the machine, which was constructed in our own building, or shop, there were four ports, so-called. Each of the ports had a flow rate meter on it. And so before you started the experiment, you could --

Q. Set it?

A. You could open a valve and set that meter to read 500 cc's per minute, it was a mass flow meter, or 2,000 cc's per minute, and that could be done -- actually there was only one flow meter. You then switched the next port to the flow meter, and you set those ports with a valve.

And if I remember correctly, also, we had a valve that you could also dial in time. You could dial in two seconds for a two-second puff, or you could dial in one and a half

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2 seconds, or you could dial in a longer than
3 two-second puff, maybe two and a half seconds.
4 And that was, again, a thumb switch, that you
5 dialed in the digital number.

6 I might add, this was very unlike FTC
7 smoking machines. I mean, this was a
8 research-type smoking machine.

9 (Lilly Exhibit 6 for
10 identification, letter dated July 12, 1974, to
11 Dr. Max Hausermann, from Robert B. Seligman.)

02:20:08 12 Q. Dr. Lilly, you have just been handed
13 what's been marked Lilly Number 6, a letter dated
14 July 12, 1974, from Robert Seligman to Dr. Max
15 Hausermann. It has production number PA 812805,
16 or 000258120.

17 *Do you know who--*
You knew Robert Seligman, I take it?

18 A. Yes, I know and do know Bob Seligman.

02:20:48 19 Q. He was identified at that time, 1974,
20 as the director of commercial development -
21 tobacco products. Is that within R&D? Was that
22 within R&D?

23 A. You know, I don't remember whether
24 that was in R&D or not. That may have been a
25 commercial development job in New York. I'm

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sorry, I kind of tend to think it was in New York, but it could have been in R&D.

Q. It shows as New York. The letterhead, if you look at the top, shows that it's New York.

A. I tend to think it was a New York position, yes.

Q. I want to direct your attention to the second paragraph, which refers to you and Claflin. Do you see that?

A. Yes, sir.

Q. Why don't you just take a look at that.

A. Okay. Yes.

Q. This is a reference to a discussion that Mr. Seligman had with you and Claflin. Claflin was someone who worked on your team?

MR. MURPHY: I object to the form of the question. You can answer.

A. Warren Claflin worked on the combustion flow and filter efficiency thing, yes, sir.

Q. Do you recall having this discussion, that Mr. Seligman is referring to, in 1975?

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A. I recall discussions with Bob. I don't recall this particular one, but I do recall discussions about the physics of what we were doing with Bob. I don't know about this particular one.

02:23:22 Q. This seems to be talking about research center studies on human smokers. Do you see that?

A. I see the "At the Research Center people are --". Is that the third paragraph? Is that where you want me to look?

02:23:36 Q. Yes. Yes.

A. At 60 cc's per puff with a flow rate of 1800.

02:23:42 Q. And actually in the previous paragraph there is a similar reference to, in the last sentence, research center studies on human smokers.

A. Yes, sir.

02:23:52 Q. Do you recognize those references to studies on human smokers as the study that you were a subject in, or something else?

A. Well, I don't know. But I do know that what I described that I smoked on would have

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given values in peak flow rates and volumes. I don't know for sure, but in my own mind I guess I would relate those to the same thing.

02:24:20 Q. Did you conclude, on the basis of the studies that you were doing on the machine, that the FTC smoking machine was underreporting what was actually being puffed by smokers?

MR. MURPHY: John, I object to the question. I had given you some latitude here with respect to the subject of smoking machines. I think, though, that the judge ruled on May 17 that the question of whether the FTC test is an accurate test, is the best test, is a test of human smoking, is simply a comparative benchmark. The subject of the FTC test, which was the subject of an all-documents document request by ABC, is I think in principle not a subject into which the judge has found there to be relevant or discoverable matter.

I will let the witness answer the question, but I think that you are going very far afield from what the rulings of the case deem to be relevant areas of inquiry, and I would urge you to move on to appropriate areas of

Lilly

questioning.

THE WITNESS: What do I do?

MR. PAYTON: I'm going to ask you the question again.

02:26:24 Q. At this time, this is 1974, was it significant that the research center seemed to have concluded that people were smoking at an average rate of 60 cc's per puff, when the FTC machine was smoking at the rate of 35 cc's per puff?

MR. MURPHY: I object to the form of the question. You can answer it, Dr. Lilly.

A. I mean, we've been talking a couple of other times about recorders, and I think, to the best of my memory, I said I smoked with a puff rate of cc's per puff of 50. I don't remember the flow rate involved in mine. I do remember that I was slightly under two seconds, but close to two seconds, and had several puffs less than the FTC. I mean, I always viewed, in my personal opinion, that the FTC setup, or test, was only for nominal ranking, that I don't remember seeing very many people that time their between-puffs to one minute. I know me as a

Lilly

smoker, if I were smoking now, might take three in 30 seconds, and I might then let the cigarette burn up. I always viewed it as a ranking.

It's kind of interesting, too, that the kind of work we were doing in physics, which was actually done only for understanding how things happen in pyrolysis in cigarettes, seems to be being used in much more wide ways than it was intended.

I'm not surprised that people smoked different than the FTC method, by the way. But I also have no concept of what they're going to get out of the cigarette, I mean, absolutely none. I don't know what I got. I would guess, from just what I know, it was less than 16 milligrams. But I have no idea. I mean, there's so many variables there. The size of mouth, or how people smoked. I mean, that's my personal feeling about the FTC test.

02:29:14 Q. The point of the research that you and your team were doing was to better understand how smokers smoked?

MR. MURPHY: I object to the form of the question.

Lilly

I would also just add, Mr. Reporter, that it was my objection to the prior question, not Ms. Robbins. ^{I'm sure} ~~I suppose~~ that will be cleaned up subsequently.

02:29:42 Q. Dr. Lilly, did you understand my question, that it was whether or not the research that you and your team were conducting regarding flow rate and puffs, was that directed towards having a better understanding of how human smokers --

A. No, the physics people we had were very far away from psychologists. We were interested in knowing rates of removal, we were interested in knowing condensation functions, we were interested in knowing rates of oxidation. I mean, I think if you read those reports you would see that we were very much the physics guys with the pointed hats on.

(Lilly Exhibit 7 for identification, inter-office correspondence to W.L. Dunn from F.J. Ryan, dated August 16, 1974.)

02:31:06 Q. Dr. Lilly, you have just been handed what's been marked Lilly Exhibit Number 7, a memo from F.J. Ryan to W.L. Dunn, dated August 16,

Lilly

1974. It has production number PA 816165 through PA 816170, or 1003295088 through 5093. I'm sure that's incorrect -- yes, that's right.

And if you notice, on the fourth page, which is where the cc's are, you will see that you are one of the persons who is copied on this. Do you see yourself at the bottom there?

A. Yes, I do.

Q. Why don't you take a look at this.

A. Can I look at it a second?

Q. Yes.

Do you remember this memorandum?

A. I see my name is on it. I don't remember it, by the way, explicitly. But I'm on the distribution list, yes, sir.

Q. Do you remember what is being referred to in this memorandum, anyway, as experiment puff 6?

A. No, sir, I don't remember that language.

Q. Let me ask you to turn to page 4.

A. Okay.

Q. Page 4 has at the top a heading called "Comments." Do you see that?

Lilly

A. Yes, sir.

Q. It reads, "These observations strongly support the dose hypothesis." Are you familiar with the dose hypothesis?

MR. MURPHY: I object, John. I think that's a sentence that you are taking out of context. I think you should read the entire paragraph, and indeed I think really that you should read the whole page into the record, but I will let you do that a piece at a time, if that's the way you want to do your examination.

MR. PAYTON: He read the memo. I just want to know if he understands what the reference to dose hypothesis is.

A. I don't know what dose hypothesis means. It's not the language, my language. I don't know what that means.

Q. Are you familiar with a hypothesis that says that smokers will adjust their puff volumes in order to compensate for a change in the tar and nicotine content of the cigarette they are smoking?

A. I've heard it some time, and I'm not sure exactly, maybe it was in the literature,

Lilly

maybe someone told me, that hypothesis, yes, sir.

Q. Were you aware of any studies conducted by persons at the Philip Morris Research Center to prove or disprove that hypothesis?

A. I don't recall ever being involved in any studies to do that. Awareness? I don't remember explicitly that.

Q. Are you familiar with a study that is entitled "A Long-Term Switching Study"?

A. No.

Q. Dr. Lilly, what is your knowledge as far as the role that nicotine plays, if any, in smokers continuing to smoke?

A. I know nicotine is, in general, in part of what is in the smoke in cigarettes. I'm certainly not qualified to talk about nicotine pharmacology at all. I'm very far away from that. I am a smoker. I don't smoke cigarettes on weekends or at nights after I leave work. That's been one of my characteristics for many years. I don't have a real good feel for what I smoke cigarettes for. My guess would be it's not for nicotine, since I can go for a long time

Lilly

without smoking them. My guess is I like to have something in my hands, like I eat my glasses. But I'm not a nicotine pharmacologist, not at all.

02:41:04 Q. Are you familiar with research that has been conducted at the Philip Morris Research Center on the question of what role, if any, nicotine plays in why smokers continue to smoke?

10 A. Nothing comes to mind. I mean, I certainly -- I mean, I've heard talks given on nicotine by scientists visiting. I don't remember explicitly, and that's my own memory. That doesn't say that there's not documents.

02:41:52 Q. You don't recall any reports or studies on that question?

17 A. On nicotine -- say the question again, if I might ask.

02:42:04 Q. The role that nicotine plays, if any, on why smokers continue to smoke.

21 A. I'm sorry, I don't explicitly remember those documents as I sit here today. I remember we had a denic cigarette. I was part of that.

02:42:30 Q. That's in the 1980s, late 1980s?

1 Lilly

2 A. Mid eighties, yes, sir.

02:42:44 3 Q. Let me ask take you take a look at, I
4 believe, what was marked as Lilly Exhibit 2. I
5 may be wrong about that. It is the report that's
6 dated November 1971.

7 A. Yes.

02:43:06 8 Q. And this is the research center
9 report that has you on the distribution but that
10 you did not recall.

11 A. I'm still trying to think about why I
12 was on the distribution list. But I do see I'm
13 on the distribution list.

02:43:22 14 Q. I was asking if you had seen any
15 reports, and I understand you didn't recall
16 seeing this, but do you recall seeing any reports
17 like this, "Why does the smoker continue to
18 smoke"? I'm just reading from the introduction, *same questions I read to you*
19 the same two sentences I read to you.

20 A. Yes, right.

02:43:38 21 Q. You don't recall seeing any other
22 reports or studies like this on this subject, why
23 does the smoker continue to smoke?

24 A. I mean, I don't recall while I'm
25 sitting here. You know, in fact, I didn't recall

1 Lilly
2 this one. That is not to say that I didn't get
3 circulated reports. I do remember hearing some
4 visiting lectures talk about nicotine. It's been
5 more recently than in the seventies, by the way.
6 It wasn't a subject that was at the top of my
7 agenda during those early days. And I'm still --
8 I wish I could tell you why I was on this report,
9 this one. I don't know. I don't know whether I
10 was a subject -- maybe I was a subject.

02:44:26 11 Q. You don't recall research that came
12 out one way or the other?

13 A. I don't recall one way or the other
14 whether I had reports like this. I don't
15 remember this one.

02:45:18 16 Q. Do you recall any reports that
17 referred to the possibility that nicotine level
18 was related to the competitiveness, competitive
19 ability of a cigarette in the marketplace?

20 MR. MURPHY: I object to the form of
21 the question. You can answer it.

22 A. I'm trying to think. I don't
23 remember any.

02:46:10 24 Q. Did you ever have conversations with
25 Dr. Dunn about any of his views or theories or

Lilly

hypotheses regarding nicotine's role in why people smoke and continue to smoke?

A. I really didn't know Dr. Dunn very well early. When we were both principal scientists, I knew that Dr. Dunn had the hypothesis that consumers smoked for nicotine, and I did have arguments with him, unscientific that they may be, that I didn't believe that. And those were based on my own views, based on my own experience.

I don't recall at the time he retired from the company that either person changed their views. He was an advocate for nicotine; I do understand that.

02:47:16 Q. Did you understand his theory to be that all smokers smoke because of nicotine or that some smokers smoke because of nicotine?

A. I understood his thesis to be that the majority of smokers smoke for nicotine.

02:47:32 Q. And, therefore, your personal experience wasn't necessarily inconsistent with his theory?

MR. MURPHY: I object to the form.
You can answer.

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1 Lilly

2 A. In that I could be an outlier, that's
3 correct.

02:47:58 4 Q. I have to tell you, that's a term I
5 don't use, but I like it, an outlier.

6 Dr. Lilly, did you see the Day One
7 broadcast that is at issue in this litigation?
8 It ran on February 28, 1994.

9 A. As I remember, I saw the last part of
10 the broadcast. I did see the entire one this
11 week, when I was sitting with our counsel here.

02:48:48 12 Q. You reviewed it in preparation for
13 your deposition?

14 A. I watched it in its entirety. I
15 hadn't watched it in its entirety before.

02:49:00 16 Q. Do you recall now that there were, I
17 believe, several quotations from Dr. Dunn with
18 respect to cigarettes being nicotine delivery
19 devices? Do you recall that?

20 MR. MURPHY: I object to the form of
21 the question. I think that the question is not
22 intended to be misleading, but I think it
23 actually is inaccurate. "Several" is, I think,
24 an overstatement, to say the least.

25 MR. PAYTON: I will read from the

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1 Lilly

2 transcript of the broadcast, and I will just read
3 the references.

4 MR. MURPHY: That would be fine.

02:49:36 5 Q. It's one little paragraph, and I will
6 read the paragraph. You are welcome to look at
7 the transcript, if you want, if you want to see
8 it, but I'm just going to read a little section.

9 A. I'll accept your reading.

02:49:48 10 Q. This is John Martin, "And one thing
11 smokers are supposed to get is nicotine. That
12 was made clear decades ago by a Philip Morris
13 official. He wrote this confidential internal
14 memo, think of the cigarette pack as 'a storage
15 container for a day's supply of nicotine,' think
16 of the cigarette as 'a dispenser for a dose unit
17 of nicotine,' think of a puff of smoke as 'the
18 vehicle of nicotine.'"

19 Do you remember that, generally, from
20 what you reviewed?

21 A. I mean, generally, I remember Bill
22 Dunn's name, and generally I remember remarks
23 like that.

02:50:32 24 Q. Do you recall if you ever saw the, or
25 any, memorandum that he wrote that contained

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1 Lilly

2 those quotes or those references to nicotine
3 dispensers, or nicotine vehicles?

4 A. I don't remember ever reading those
5 things written by Bill. But he really wasn't a
6 confidant of mine in the early days I was there,
7 I will say.

02:51:24 8 Q. How did you prepare for this
9 deposition?

10 MR. MURPHY: I object. The witness
11 can answer a proper question, but I think that
12 question is too broad.

02:51:34 13 Q. Apart from discussions you had with
14 your counsel --

15 A. Yes, sir.

02:51:38 16 Q. -- what did you review in preparation
17 for your deposition today?

18 A. I did see the Day One tape, and I did
19 look at several documents, no more than three or
20 four, if I recall, and I spent some time with
21 Barbara and David.

02:52:02 22 Q. Do you recall the documents you
23 reviewed?

24 A. I was going to say I have a lousy
25 memory, but one of them was the transcript of the

Lilly

Day One document. I do believe one of them was one of these earlier ones that I have here.

Q. One of the reports?

A. One of the research reports. I don't remember the others. There was not very many.

Q. Were they your documents or documents that were distributed to you, or do you remember?

MR. MURPHY: John, I object. I mean, I think that it is perfectly appropriate for you, as you put a document in front of him, to ask him whether this is a document that he has seen in the course of his preparation, and we have done that with your witnesses and you with ours, but I think that at this point you are fishing around for attorney work product and attorney-client communications in connection with preparation, and I don't think it's appropriate. I think that you have appropriate ways of testing whether or not this witness' recollection has been refreshed by a particular document, as to a particular subject. You can even ask him, when you inquire into a subject without a document, whether he reviewed a document on that subject that

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1 Lilly
2 refreshed his recollection in preparation for his
3 testimony.

4 But I think that this inquiry up
5 front into the preparation sessions is
6 inappropriate. I don't think that Mr. Sax has
7 let ABC witnesses answer questions along these
8 lines. And I'm going to instruct Mr. Lilly not
9 to answer this question.

10 MR. PAYTON: Okay.

02:53:34 11 Q. You accept the instruction?

12 A. I accept my attorney's instruction,
13 yes, sir.

14 MR. PAYTON: I will tell you, Mr.
15 Murphy, I don't think it is inappropriate at all,
16 and it certainly didn't intend to delve into
17 attorney work product, and I have, I believe,
18 asked similar questions, and I think in a
19 similarly low-key way. I understand you
20 instructed your witness. All right.

21 MR. MURPHY: If you want to ask him,
22 John, whether he reviewed any documents that
23 refreshed his recollection on any subjects as to
24 which he has yet testified, I would let him
25 answer that question. If he remembers what he

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Lilly

reviewed, obviously.

Q. Dr. Lilly, you said that you played some role in the ART process. You have described it another way. But do you know what I mean by the ART process?

A. I know what ART means, yes.

Q. What is ART?

A. It means alkaloid reduced tobacco.

Q. Did you review documents relating to ART in preparation for your deposition today?

A. I don't recall reviewing any ART documents in preparation for today, no, sir.

Q. Dr. Lilly, what is your knowledge of Philip Morris' cigarette manufacturing procedures?

A. I've never worked in manufacturing. I've been to the plants. I've developed some processes that the plants used. So I'm certainly not an up-to-date expert on manufacturing procedures at all, although I'm not unaware of them, either.

Q. For example, how familiar would you say you are with the RL reconstituted tobacco process?

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1 Lilly

2 MR. MURPHY: I object to the form.

3 The witness can answer the question.

4 A. I would say I'm familiar with the
5 overall concept of RL. I would say if you put me
6 in the plant and told me to go to a particular
7 place or vat, I wouldn't know where to go. But,
8 you know, top-line familiarity.

9 MR. PAYTON: Do you want to take
10 about a five-minute break?

11 THE VIDEO OPERATOR: We will go off
12 the record at 2:57:03, on Videotape Number 2, and
13 continue the deposition of A. Cliff Lilly on
14 Videotape Number 3 for June 30, 1995.

15 (A recess was taken.)

16 THE VIDEO OPERATOR: We are back on
17 the record at 3:14:05, continuing the deposition
18 of A. Cliff Lilly on Videotape Number 3 for June
19 30, 1995.

20 BY MR. PAYTON:

03:14:16 21 Q. Dr. Lilly, did you review any
22 documents, on your own, that is, not documents
23 that your counsel showed you, but documents on
24 your own, in preparation for your deposition?

25 A. No, sir, I did not review any on my

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Lilly

own.

(Lilly Exhibit 8 for
identification, document entitled "Smoking and
Health Program, Status Report, December 1978.")

03:15:10 Q. Dr. Lilly, you have been handed
what's been marked Lilly Exhibit 8, a report,
status report, of the Smoking and Health Program,
dated December 1978, of the National Cancer
Institute. It has production number PA 640987
through PA 611101, or 1003099035 through 9149.
It's stamped "Draft."

Let me actually tell you why I am
showing you this, and also direct you to
something.

A. Okay.

03:16:06 Q. This is a draft report by the
National Cancer Institute, and it attaches at the
very end a list of --

A. I'm sorry. What page?

03:16:32 Q. If you go to Appendix A, which is
about halfway through, and it says, PA 641031,
you will see that there is Appendix A, "Advisory
and Consulting Resources," and then it has a list
of Smoking and Health Program consultants. Do

Lilly

you see that?

A. Yes.

Q. And you are listed as one of the consultants on page A-3, at the bottom. Do you see that?

A. Yes, I see that.

Q. Lilly, Clifford, Philip Morris. I actually don't have specific questions about this. I just want to know if you recall what your role was with respect to the Smoking and Health Program.

MR. MURPHY: I object to the form of the question, but you can answer the question.

A. Dr. Osdene, I'm not sure I remember the exact date, but Dr. Osdene, who was a member of an industry -- or represented one of the members of industry at NIH, in, I recall, Dr. ~~Gori's~~ ^{Gori's} tenure there in smoking and health, asked me to take a trip with him to one of the meetings, and, if I recall, there was some discussion of aerosol generation and some measurements of aerosol size, and so forth. It was the only trip I ever took there, by the way. And I assume Tom took me because if something

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1 Lilly
2 came up he didn't know about, he wanted me
3 there. I sat in on some of the talks, and I seem
4 to remember that they didn't let me sit in all of
5 them, because I remember standing in the hall for
6 part of it.

7 MR. MURPHY: Just to be clear for the
8 record, is Dr. Geo, who you referred to in your
9 answer, Dr. Lilly, Dr. Geo Gori? Is that the
10 same individual?

11 THE WITNESS: Pardon me, I meant Dr.
12 Gori. I'm sorry.

13 A. That's why I assume my name is listed
14 there. I do remember getting a check from
15 somebody, and, if I recall, I turned it over to
16 Philip Morris because I also got a salary on the
17 day I was going there.

03:19:16 18 Q. Did you play any role in the
19 preparation or review or editing of this report?

20 A. No, sir. This is the first time I've
21 ever seen the report.

03:19:44 22 Q. You were one of the principal
23 scientists at the research center from 1981 to
24 1984. I'm just looking at your resume.

25 A. I did get a promotion in 1981 to

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1 Lilly

2 principal scientist, yes, sir.

03:20:04 3 Q. And in 1984 you became, I take it,
4 what you are now, a research fellow and director
5 of technology assessment?

6 A. Yes. I got promoted to research
7 fellow in '84. I think the title of director of
8 technology assessment was added a couple of years
9 after that.

03:20:24 10 Q. And you described going from
11 principal scientist-research fellow as a
12 promotion?

13 A. It was a promotion in salary grade
14 for me, yes.

03:20:36 15 Q. What's the job description, or what
16 are the responsibilities that you had once you
17 became a research fellow?

18 A. Well, it was the first research
19 fellow job, so I had a little bit of leeway at
20 setting those myself.

03:20:54 21 Q. Was it created for you?

22 A. I'm not sure if it was created for
23 me. I was the first one that got the job.

24 The research fellow was really
25 responsible for insuring that Philip Morris R&D

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Lilly

was working on suitable technology five and ten years from now that the company would need. It had a responsibility of trying to develop people, and in that regard there were a number of people who were rotated through to work with me. It had a job of representing a lot of the technical functions to outside universities, and in that regard I served on advisory boards for several physics departments in the state and out of the state. And it had a responsibility of being program leader for things that involved new technology that we hadn't been in before.

What was added to that with the technology assessment was also the responsibility for not to do the planning, but responsibility that a five-year plan and operational planning was done. And the technology assessment thing reads on, having a responsibility for being aware of what technology is emerging, in or out of the tobacco business.

Q. Were you, for example, responsible in any way for potential new products that would be simply nicotine delivery devices?

MR. MURPHY: I object to the form of

Lilly

the question. I think the question is argumentative. But I also think that there is an issue here, John, as to whether this witness is going to be permitted to testify as to new product development plans with respect to any nonconventional cigarette product. I think the judge's May 17 ruling is clear. I think that ruling contemplates that there will not be discovery of the details of any Philip Morris proprietary research into the area of new product development efforts.

If you can ask a narrower question, I will evaluate our position on a question-by-question basis.

03:23:56 Q. Dr. Lilly, I'm not attempting to elicit any details, or even at this point the identification of any particular product. I simply want to know if among your responsibilities as a research fellow you were interested in the development of new products that were to be nicotine delivery devices.

MR. MURPHY: You can answer the question.

A. I don't recall being responsible for

Lilly

any product that was intended to be a nicotine delivery device. Any nonconventional cigarette that I've had anything to do with was one that used tobacco. There may be technologies that it may be used in a particular way, but it was always used in tobacco.

Q. Are you familiar with concerns about the possible obsolescence of Philip Morris' current product, cigarettes?

MR. MURPHY: I object to the form of the question. You can answer the question.

A. I mean, you know, the domestic tobacco business goes down a couple of percent a year. The export business goes up 5 or 10 percent a year. I think, strategically, anyone in a planning role looks at the business. I don't remember that I looked at it in any concerned way.

Q. No, I wasn't asking whether you were concerned. I was simply asking whether or not, as a research fellow, you played a role in either assessing or recommending or developing any such nicotine delivery devices.

A. And my answer to that --

1 Lilly

2 MR. MURPHY: I object to the form of
3 the question. I think that misstates your prior
4 question. If you are posing a new question,
5 that's fine, John. But I think that you are
6 asking a very different question now from the one
7 that you asked previously. And I don't think you
8 intend to mislead the witness, but I think that
9 you are skipping back and forth and saying
10 that --

11 MR. PAYTON: I will just ask him this
12 question.

13 MR. MURPHY: Okay.

14 MR. PAYTON: I don't think I was
15 confusing him. But we don't need to argue about
16 it.

03:26:58 17 Q. Here is the question: Whether or not
18 as a research fellow you played a role in either
19 assessing or recommending or developing nicotine
20 delivery devices for Philip Morris.

21 MR. MURPHY: I object to the form of
22 the question. I think the witness has asked and
23 answered that question. Has answered it, excuse
24 me.

25 A. I never played a role or suggested

1 Lilly
2 that Philip Morris should go to nicotine delivery
3 devices, other than nicotine that would be
4 delivered as part of normal tobacco heating or
5 pyrolysis.

03:27:38 6 Q. It is going to be simpler if I simply
7 show you something.

8 (Lilly Exhibit 9 for
9 identification, Philip Morris U.S.A. R&D
10 Strategic Plan, 1992 through 1996.)

03:28:32 11 Q. Dr. Lilly, you have been handed
12 what's been marked Lilly Number 9?

13 A. Yes, sir.

03:28:44 14 Q. Which is a copy of the Philip Morris
15 U.S.A. R&D strategic plan. It says 1992 through
16 1996, but I understand this to be the 1992
17 strategic plan. Is that correct? They are
18 always five years.

19 MR. MURPHY: I object to the form.

03:28:54 20 Q. Am I right, Dr. Lilly?

21 MR. MURPHY: If the witness
22 understands what he is being asked, he can answer
23 the question.

24 A. In general, we do a five-year
25 strategic plan, and in general most of the

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Lilly

information is for the next year, if that's your question.

Q. Well, no, I'm just saying, this is the one that was prepared in 1992, and it shows for five years?

A. That's correct.

Q. And it is a huge document. It is more than a huge document. This is Volume 2. There is a Volume 1, but I'm only showing you Volume 2, which are the appendices to the strategic plan. If you want to look at the Volume 1 -- okay, you have both things. It goes from PB 218243 through PB 218822, or 2021529640 -- I'm sorry, scratch that number. It goes from 2021529526 through 2021530105.

MR. MURPHY: Just for the record, the exhibit begins with 9528 and ends at 0105.

Q. Dr. Lilly, do you recognize this as Philip Morris U.S.A. R&D strategic plan, 1992?

A. I recognize it as that. I didn't realize it was quite so big.

Q. This is a document that you routinely receive, that is, the regular strategic plan?

A. This is a document that we do every

1 Lilly

2 year, and even though I don't write it, I'm
3 responsible for making sure it's written by
4 somebody.

03:31:50 5 Q. Could you just quickly tell me what
6 your role is in connection with the strategic
7 plans?

8 A. Yes. The strategic planning --
9 ^{were} strategic plans/written in this form started, and
10 again my memory, I think in 1988, maybe '87. And
11 the way it's done -- the role of director of
12 technology assessment has the planning
13 responsibility as part of that job, and the way
14 it's done, to get input from more than just one
15 place at the research lab, there is a planning
16 committee that's formed, and a chairman of that
17 committee appointed.

18 It's the responsibility of that group
19 to do two things: To write a good situation
20 analysis in that year of issues that might face
21 the business, usually done from public sources,
22 and then to write a set of strategic objectives
23 for the laboratory in general, and then from
24 those objectives there is an operational plan
25 done that actually is more resource and budget

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Lilly

intensive, and those are the resources we are going to apply against a particular program. And that's done every year. In fact, we are working on the strategic one now. And has been done that way since the late eighties.

03:33:42 Q. Are you also responsible for the preparation of the various appendices?

A. No. The appendices, as envisioned, are to represent a situation analysis that is supposed to present for that particular time period some array of what the situation surrounding the particular business is, our business, the cigarette business in general.

03:34:20 Q. You don't think you play any role in connection with the appendices?

MR. MURPHY: I object to the form of the question. You can answer.

A. I don't remember ever writing an appendice. In general, the committees did it, you know, as part of the strategic plan.

03:35:54 Q. Let me ask that you look in the body of the strategic plan itself, which I believe is simply numbered consecutively, and I would like you to go to page 79. At the bottom of page 79,

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1 Lilly

2 there is an E, Strategic Goal Number 5. Do you
3 see that?

4 A. Yes, I see that.

5 MR. MURPHY: Just to be clear, before
6 we go into the line of questions, John, I know
7 that under the stipulation and protective order
8 there is a presumption of highly confidential or
9 trade secret protection of the deposition
10 transcript pending designations, but I just want
11 to be absolutely clear that this line of
12 questioning with respect to strategic plans of
13 R&D is being designated trade secret, or highly
14 confidential, or both.

15 MR. PAYTON: Yes.

03:37:36 16 Q. And strategic goal number 5 is about,
17 I think, just oversimplified, about new products,
18 vision for the long terms, it says.

19 A. I was trying to look at what the
20 actual goal was. That didn't do me much good.
21 Okay.

03:38:28 22 Q. Go back to page 3. I think the goal
23 is there. I'm not sure it is going to help you,
24 but it's there. Do you see it? It is right in
25 the center of page 3.

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Lilly

A. Yes, it's the vision stuff,
futuristic stuff.

03:38:54 Q. Develop technologies applicable to
future products and processes.

A. Yes.

03:39:06 Q. And this is a section that discusses
various types of new products. They are
identified at the top of page 81, just kind of
categories. And where I actually want to go is
to the last paragraph on 81 that runs over to
82.

A. Are you looking down at the bottom?

03:39:30 Q. Yes. If you want to look at the
previous parts, you can, though. It's just a
page and a half.

A. Just give me ten seconds to look at
that.

03:39:38 Q. Certainly.

A. Okay. You want me to go to 82?

03:40:02 Q. We are coming to 82 as well, because
on 82 there is a reference to ART.

A. Okay.

03:40:10 Q. And I want to discuss these two
things, ART and this last paragraph on 81, which

1 Lilly
2 are about nicotine-containing products.

3 As the research fellow, I simply want
4 to know if you were involved in making any
5 assessments with regard to future
6 nicotine-containing products.

7 MR. MURPHY: Without any waiver with
8 respect to the May 17 ruling of the court, I will
9 let Dr. Lilly answer that question.

10 A. I'll tell you what I remember about
11 this.

03:41:14 12 Q. Okay.

13 A. And this, as I say, is a result of
14 lots of people's inputs, representatives from all
15 over R&D, and so forth. There was a concern, at
16 least at the time, and you've got to remember
17 research results and interest goes with timing,
18 when there was large amounts of advertisements in
19 scientific papers, and so forth, about patches
20 and people quitting smoking, and concern among
21 some of our scientists that doctors and the
22 pharmaceutical industry could essentially work
23 with pure nicotine in these things, and should we
24 worry about the sky falling and those products
25 becoming more and more part of smokers quitting

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Lilly

in general or otherwise.

I think that's why you see that discussion there.

Q. Were these considered competing products?

MR. MURPHY: I object to the form of the question. You can answer the question.

MR. PAYTON: No, that's a fair objection.

Q. Were the products that are described in 81, the bottom paragraph,, transdermal patches, nicotine patches, nicotine-containing products for the smoking cessation market, were these considered to be competing products to Philip Morris' cigarettes?

MR. MURPHY: I object to the form of the question. You can answer.

A. I'd have to answer in that it was written here that new types of smoking products, I say smoking products, don't have to come out of the traditional competitors. There was concern about the rapid growth of patches. There were concerns about patents coming onto the literature, such as from Procter & Gamble, that

Lilly

solubles

actually described, you know, tobacco, ~~both~~
nicotine delivery things in an electrical-type
device.

I think these type of things do
concern scientists who have a vision long-term.
That doesn't mean that there are lots of programs
that immediately get instituted to do these
things. I mean, this is a strategic plan that in
a way, the 20-year part of it, I wouldn't be
surprised to look in here and see room
temperature superconductivity or something. That
doesn't mean that we could do it, or would do
it.

But there was a concern of this kind
of product coming on the market, and I think
that's reflected here.

03:44:40 Q. A lot of these products were already
on the market; isn't that right?

MR. MURPHY: I object to the form of
the question. I think you can be more specific.

But if you understand the question,
you can answer it.

A. I think I understand the question.
Some of them have been on the market for a while,

Lilly

and there were more of them coming on the market, and the overall sales volume looked like it was beginning to become just not a small so-what thing. I mean, we were talking about hundreds of millions of dollars, that's correct.

03:45:14 Q. And these products, and I will try to be more specific, these products, which include products made by Marion Merrell Dow, Ciba-Geigy, Lederle, Farmacia, Warner-Lambert, which include things like patches, Nicorette gum, transdermal nicotine patches, were seen as, at that time, 1992, relatively minor competitors?

MR. MURPHY: I object to the form of the question. I think it misstates his testimony on this point, and I think it was --

MR. PAYTON: No, I'm asking the question. I'm not trying to restate his testimony. I'm just asking the question.

03:45:58 Q. Were they seen as minor competitors?

MR. MURPHY: Again, I object to the form of the question. You can answer the question.

A. I think that what they were seen at as, for the first time in the tobacco business,

Lilly

1
2 were other companies who were outside the
3 business beginning to get large sales in an area
4 that involved the business, even though it was
5 smoking cessation. And these were in some way
6 diffusion devices that let nicotine into the
7 bloodstream. I think that would be normally
8 viewed the same way as if we went into the chip
9 business and Intel looked at it. I mean, I think
10 it would be a normal type of long-term planning
11 view.

03:46:58 12 Q. Does Philip Morris view itself as
13 being in the nicotine business?

14 MR. MURPHY: I object to the form of
15 the question. You can answer the question, Dr.
16 Lilly.

17 A. Well, the thing that I hear quoted
18 around is that we're in the -- we're not in the
19 tobacco business, we are in the smoke business.
20 I view the company as being in the tobacco
21 business, by the way, but there are people who
22 say we sell smoke.

03:47:24 23 Q. People in the company that say that?

24 A. Yes, sir.

03:47:36 25 Q. Do you remember discussions relating

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Lilly

to nicotine inhalers?

MR. MURPHY: I object to the form.

Is there a time frame on this question?

MR. PAYTON: I'm talking about in connection with this strategic plan. It's the next paragraph.

A. I remember reading papers in which ~~Pharmacia~~ ^{Pharmacia} was developing inhalers, or I think nasal sprays is what I actually remember. Yes.

Q. Nicotine inhalers, nicotine nasal sprays?

A. Okay, I see inhaler. I remember it as a nasal spray, if I can remember correctly.

Q. I believe there may be two different things, and there may be a nasal spray and there may be an inhaler?

A. Yes, sir, I accept that.

Q. Without discussing any specific new product or proposed new product at all, I want to ask if Philip Morris has considered expanding into this business.

MR. MURPHY: I object to the form of the question. What business?

MR. PAYTON: This business of

Lilly

nicotine aerosols and nicotine inhalers.

MR. MURPHY: With that clarification,
you can answer the question.

A. To my knowledge, Philip Morris has
not considered and has no plans of getting into
that business.

03:49:36 Q. And has Philip Morris considered
getting into the business of nicotine patches,
nicotine gum, without identifying any particular
product or proposed product?

MR. MURPHY: Again, I object to the
form of the question. You can answer it, if you
understand the question.

A. I've never heard us talk. I'm not
part of New York planning, but I've never heard
any talk about us getting into this business, no,
sir.

03:50:02 Q. Were you part of the process that
resulted in this discussion of Strategic Goal
Number 5 in this exhibit?

A. I certainly have a lot of interest
personally in where the company goes long-term,
yes.

03:50:24 Q. Did you play a role in this section?

Lilly

A. I didn't write this. I certainly -- I mean, I remember reading parts of this. No, I did not write this.

Q. What was the role you played?

A. Well, as a member -- we're talking about now, what, '92. In '92, I am part of the -- one of the people who reports to the senior vice president, and so I'm in that regard part of the senior management staff, I suppose, of the laboratory. And part of our responsibility is to encourage and listen to and, you know, get out of the laboratory a strategic plan and an operational plan. And so that would be my role.

My responsibility would be that the committee that put this together actually, I would be responsible for making sure the plan got out, but I don't, in fact -- I probably wouldn't be asked to help write it if I know the committee will. But I would be responsible that it got out.

Q. Would you have seen it in draft form?

MR. MURPHY: I object to the form of

Lilly

the question. Are you asking him did he, or would he, or which?

03:52:14 Q. Did you see this in draft form?

A. I don't remember seeing it all in draft form. I would certainly have seen a draft before the final total thing.

03:52:40 Q. I'm at the bottom of page 81. Just go back one page.

A. Page 81, okay.

03:52:44 Q. The paragraph I was directing your attention to that begins, "The next type of product to be discussed, a product which can provide tobacco flavor and impact in an aerosol form is of considerable current significance."

A. I'm having trouble finding that.

03:53:02 Q. It's the last paragraph on page 81.

A. Oh, it's up here, sorry. I was looking at the last sentence.

03:53:08 Q. Do you see that? It say, "The next type of product to be discussed, a product which can provide tobacco flavor and impact in an aerosol form is of considerable current significance."

A. I see that.

Lilly

Q. "Our business is gradually but certainly changing." Do you see that?

A. Yes, sir.

Q. Does Philip Morris expect that its role in this business is changing as well, and is it considering -- I will ask them one at a time. Is it considering getting into the business of developing an aerosol product? I'm going to ask those one at a time, but I want you to hear the whole thing.

A. Okay.

Q. Is Philip Morris' role in this business changing?

MR. MURPHY: I object to the form of the question. I think it's vague and ambiguous. I don't think that you have specified what the business that you are talking about is. If the witness has an understanding, he can answer the question, but I think it would be simpler to reframe it.

A. I don't have a feeling of what was meant by that sentence.

Q. Do you know if Philip Morris was considering developing an aerosol product, as is

1 Lilly
2 discussed in the bottom paragraph here?

3 MR. MURPHY: I object to the form of
4 the question. You can answer.

5 A. Philip Morris was active in, you
6 know, nonconventional cigarette products, and I
7 want to stress cigarettes, because they all
8 derived, everything, flavors and nicotine, from
9 tobacco. Those looked a little funny, but they
10 were -- they did deliver a smoke aerosol. And
11 without getting into the details of those, they
12 started, you know, many years ago, and there was
13 lots of resources spent in after the Premier came
14 out because there was lots of worry about
15 competitive advantage. And that fundamental
16 research and development goes on today.

17 I wouldn't characterize any of these
18 as nicotine delivery devices. I would
19 characterize them as a little different looking
20 ways to heat tobacco and derive a smoke aerosol,
21 that in some cases would contain nicotine, and in
22 some cases used denic and didn't contain
23 nicotine.

03:55:54 24 Q. The products that are referred to in
25 the paragraph at the bottom of 81, that are

Lilly

marketed by Marion Merrell Dow, Ciba-Geigy,
Lederle, Farmacia and Warner-Lambert, those
aren't tobacco products, are they?

A. Not to my knowledge, no.

03:56:22 Q. Those are nicotine delivery devices,
aren't they?

MR. MURPHY: I object to the form of
the question. You can answer the question.

A. I mean, I think they're transdermal
nicotine patches. I mean, from my knowledge of
it, yes.

03:56:40 Q. That's a nicotine delivery device?

MR. MURPHY: I object to the form of
the question. You can answer.

A. It certainly diffuses nicotine across
a membrane, I mean, when you put it on your arm.
That's correct.

03:57:00 Q. Dr. Lilly, let me ask you to go to
the appendix that I believe relates to this
section, and it is --

A. If you give me a hand, I will try to
find it.

03:57:12 Q. I am going to direct you to it. It
is PB 218597.

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Lilly

A. 2185 --

03:57:20 Q. 97. And it's about, I don't even know how to estimate this, a third of the way through the rest of it. It says Appendix J.

A. I'm laughing about who would have read this.

03:57:50 Q. I have to raise my hand.

A. 8548. I'm slowly getting there.

03:57:58 Q. 218597.

A. I'm still not there yet. Sorry.
Excuse me for my slowness.

03:58:26 Q. It's the number at the bottom.

A. I've got a --

03:58:30 Q. You're right, sometimes they are on the side and sometimes at the bottom.

A. 218593, 218594, 95, 96. Okay.

03:58:46 Q. Now you are at Appendix J, which is entitled "Smoking Cessation," it's misspelled, but it's "Smoking Cessation, Nicotine Delivery Devices." Do you see that?

A. Yes.

03:58:58 Q. And you open to the actual text, "Smoking Cessation, Nicotine Delivery Devices."

A. Okay.

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Lilly

Q. Do you remember having seen this term in any of these reports, nicotine delivery devices?

MR. MURPHY: I object to the form of the question. You can answer it.

A. Well, what the appendices are supposed to do is to give the reader some feeling of the situation that exists in markets, you know, that could be interesting to tobacco planning. And I do think I remember seeing this in there and read it as simply that, an information thing about what was happening in the nicotine, you know, or the smoking cessation business.

Q. If you want to look through this, you can. I think it goes over almost the same kinds of -- it is almost the same paragraph.

A. If you don't mind, I will take a few seconds.

Q. Go ahead. It's four pages.

A. Okay, I looked it over.

Q. Do you remember seeing this before, Appendix J?

A. I certainly remember that it was in

Lilly

this report. I couldn't testify to you that I read every word of this, of, in fact, the appendix at all.

04:02:00 Q. Does the appendix come to you in draft form?

A. I remember that the decisions and drafts that we would normally look at more would be the actual strategic plan that we had to put resources around. The appendix is the spirit of it, to be kind of an encyclopedia type thing.

04:02:28 Q. With regard to this specific appendix, Appendix J, do you know who would have been responsible for drafting this?

MR. MURPHY: I object to the form. You can answer.

04:02:40 Q. Do you know who was responsible for drafting this?

A. Yes, I understand your question. I'm trying to -- I don't know exactly. There's a lot of knowledge there of a particular kind. It would be -- I remember who the chairman of the committee was.

04:03:12 Q. Who was that?

A. It's a gentleman named Ted Sanders.

Lilly

04:03:18 Q. Who is Ted Sanders?

A. Ted Sanders is a Ph.D. organic chemist I.

04:03:30 Q. He is a scientist in the research center?

A. Yes, he is a scientist in the research center. He just returned to the research center, if I can add that. He was a director of research for PM Europe for three years.

04:03:54 Q. This would have been done under either his supervision, or that's the way you remember this?

A. I remember -- Ted Sanders actually reported to me, and I remember that he was the chairman of the strategic planning group as his last job reporting to me before he went to PM Europe. And he just came back.

04:04:24 Q. He has just come back.

A. That's my surmise as to who was chairman of the planning committee.

04:04:42 Q. Would you go to the third page of the actual text. It is PB 218600. At the top it says D. Efficiency.

Lilly

MR. MURPHY: Efficacy.

Q. Efficacy. Yes, I'm looking at that.

Q. If you go to the bottom, it says "E. Products of the Future." Do you see that?

A. Yes, sir, I see that.

Q. Do you see the first sentence of that section reads, "Prevailing wisdom suggests that since smokers smoke in order to obtain nicotine, that any method which introduces nicotine through a noncigarette product will assist a smoker in giving up cigarettes."

A. I hear that. I see that.

Q. Do you agree with that?

MR. MURPHY: I object to the question. I think you should read him what follows that statement.

Q. "Whether or not this is true --" I'm reading what follows. "Whether or not this is true is not a relevant issue for PM U.S.A. What is relevant is that people believe it to be true. What is also relevant, however, is that two types of nicotine-containing smoking cessation aids currently are about to be marketed in the U.S. do not introduce nicotine in an

1 Lilly

2 efficient manner."

3 Do you see that? You can read the
4 rest if you want. It just describes those
5 devices.

6 MR. MURPHY: I think you should
7 continue, John. I think that if you are going to
8 ask him a question about this section, that you
9 should put the entire section in the record.

10 MR. PAYTON: He can read the rest of
11 it.

12 MR. MURPHY: You are taking it out of
13 context.

14 MR. PAYTON: He can read it.

04:06:10 15 Q. Read it.

16 A. You want me to read it?

04:06:12 17 Q. Sure.

18 A. Starting with "A device," is that
19 where you left off?

04:06:16 20 Q. Sure.

21 A. "A device which would introduce
22 nicotine efficiently would be an aerosol delivery
23 device. There is definitely some activity in
24 this area, although it may be a while before any
25 attempts are made to market such a product. ~~have~~ Kabi

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Lilly

Pharmacia

~~Pharmacia~~ has purchased technology developed by Advanced Tobacco Products relating to an aerosol delivery device. In addition, there are a number of U.S. patents dealing with this type of article, U.S. 4,945,929, U.S. 4,715,387, and U.S. 4,635,651, the first of which was granted to BAT, British American Tobacco Company."

MR. MURPHY: Keep reading, Dr. Lilly, the rest of this section, please.

A. Okay. "What is the prevailing opinion of health authorities regarding nicotine delivery devices? A quote from a recent editorial in the influential British medical journal Lancet suggests that the opinions might well not be negative. Although these nicotine replacement products are marketed as aids in stopping smoking --" this is a quote, by the way, I'm sorry -- "with further refinement some may also have potential for long-term use, and if permitted might eventually replace tobacco in the open market." A series of dots. "It seems logical to offer either a cleaner product than a cigarette," "a cleaner product" in brackets, "than a cigarette, or better still an acceptable

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1 Lilly
2 source of more pure, less contaminated nicotine.
3 This principle is the same as that of the UK low
4 tar program, a gigantic step - too big it seems
5 for regulatory authorities and health
6 professionals in the U.S.A."

7 End of quotation.

8 THE WITNESS: Do you want me to
9 continue?

10 MR. MURPHY: Yes.

11 A. Sure. Read the last paragraph.

12 A. "If attitudes expressed above become
13 widespread among health professionals, it will
14 not be too long before nicotine delivery devices
15 which are both effective and appealing are
16 introduced into the market with endorsement.
17 Should this happen, it will clearly become the
18 next wave in the cigarette market," "cigarette"
19 in quotation, "driven by health concerns. If PM
20 U.S.A. is not prepared to participate in this new
21 market, it is possible that the repercussions
22 would be severe."

23 I read the whole thing.

04:09:20 24 Q. Dr. Lilly, looking at this whole
25 section E, those three paragraphs, do you recall

Lilly

having any discussion about this section?

A. You know, I really don't. And, in fact, I'm glad you asked me to read it. I had not read the details of that. Thank you. But, no, I don't recall great discussion on this, at least not with myself.

04:09:46 Q. Go back to the first sentence.

A. Okay.

04:09:50 Q. It's on the previous page, which begins, "Prevailing wisdom suggests that since smokers smoke in order to obtain nicotine." Do you see that?

A. Yes, I see it. I'm looking at that.

04:10:02 Q. Are you there?

A. I'm there.

04:10:12 Q. Did you agree with that?

A. I don't know -- in general, I don't, but I don't know what the prevailing wisdom that whoever wrote this is talking about. It's very similar to the discussions I had with Bill Dunn earlier.

04:10:28 Q. It is.

A. I'm not sure it's prevailing wisdom, but I will certainly accept that there's some

1 Lilly
2 papers in the literature that say that that's
3 true.

4 MR. MURPHY: I move to strike
5 counsel's editorial remark.

6 MR. PAYTON: What was my editorial
7 remark? That it is similar to the discussions
8 that he had with Bill Dunn?

9 MR. MURPHY: Yes.

10 MR. PAYTON: Okay, it is similar to
11 his description of the discussions he had with
12 Bill Dunn.

13 MR. MURPHY: I don't think that was a
14 description, John. I think that was just an
15 editorial comment. The record will speak for
16 itself. *MR. PAYTON: All right.*

04:11:10 17 Q. Dr. Lilly, do you know if this
18 sentence, which reads, "Prevailing wisdom
19 suggests that since smokers smoke in order to
20 obtain nicotine," do you know if that is the
21 prevailing view at Philip Morris, that smokers
22 smoke in order to obtain nicotine?

23 MR. MURPHY: I object to form of the
24 question. You can answer it.

25 A. I certainly don't know if that's a

1 Lilly
2 prevailing view. I just don't.

04:11:50 3 Q. And having read these three
4 paragraphs, do you now recall any more about
5 whether or not Philip Morris has considered
6 participating in this market of nicotine delivery
7 devices?

8 MR. MURPHY: I object to the form.
9 You can answer it.

10 A. I mean, reading these, I still know
11 of no work or any idea of commercializing
12 anything like this. I mean, not to take away
13 that we are interested in nonconventional
14 cigarettes.

04:13:50 15 Q. Dr. Lilly, we are not going to have
16 enough time to actually launch off into a whole
17 other subject, but I would like to ask you if you
18 could just generally describe for me what role
19 you played in developing or working on the
20 development of the ART process.

21 A. Okay. I'll try to do it as
22 completely as I can.

23 Can I put a couple of historical
24 things in before I start?

04:14:24 25 Q. Please do.

Lilly

A. I was familiar when I first came to the company from the oil business in '65 that there had been research work going on with ~~both~~ ^{solubles} methylethyl ketone and methylene chloride to take nicotine -- extract nicotine from tobacco, and no or low nicotine tobacco. I also remember some work of amoniation and steam stripping to remove nicotine from tobacco. So there was an interest before I got to the company in taking nicotine out of tobacco. I don't know where it came from or what the strategy was, but there was an interest.

In December of 1985, Philip Morris, combined with or bought, I say -- the food people don't like us to say bought, but combined with General Foods, and one of the first visits at meeting the people in the food research business, or in any regard, I think was to get the two R&D groups together. And in that regard, Frank Resnik, who was the president of Philip Morris U.S.A., did host a visit from the management group at General Foods research in Tarrytown, New York, and Dr. Hausermann and his replacement, Dr. Ken Houghton, hosted a group of their reports, of

1 Lilly
2 ^a
3 which I was a member, to first ~~at~~ dinner, in
4 which we met each other, and in a series of talks
5 that gave them a feeling of our technology and
6 gave us a feeling of their technology.

7 And one of the best talks, and one of
8 the most enlightening scientifically, to
9 certainly me, was a talk given by Dr. Tom
10 Fassina, who unfortunately he has passed away a
11 couple of years ago, on how supercritical
12 extraction worked in coffee in Bremen, Germany,
13 and how they were building a supercritical
14 extraction plant in Houston, Texas.

15 When the new vice president, Ken
16 Houghton, took over, and Max Hausermann returned
17 to Switzerland, which was on January 1 or January
18 2, in one of our first staff meetings Ken
19 expressed the interest that we should really
20 think about programs in two areas. One area was
21 paper development to reduce cigarette
22 sidestream -- I don't have a cigarette but, you
23 know, the sidestream that comes from the
24 burning -- and the second was a real study as to
25 whether supercritical CO-2 would be a better way
 and could lend to a no-nicotine product better

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Lilly

than previous attempts. And then, much to my surprise, he turned to me and said, "That sounds like a project, Cliff, you should do."

Now, this was in January. And starting it slowly -- we had thought about building a one-liter system, not particularly for -- for chemistry, not particularly for removing nicotine. I had two people early, one was Harvey Grubbs and the other one was a chemical engineering named Fran ~~Euteneier~~ ^{Utsch} and along with our director of process development, whose name is Don Knudson, or whose name was Don Knudson then, he is now director of quality assurance, we took a visit to the Hoboken plant of Maxwell House, and we talked about supercritical extraction with Dr. Fassina and some of his engineers. And at that meeting he offered a small system that was in the research labs at Tarrytown. It turned out to be 14 liters, to be exact.

And so we went up and took some tobacco, and I do remember what we took, we took some all-burley, we took some all ~~pre-cured~~ ^{flue cured}, and we took some oriental, and we ran a set of

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Lilly

1
2 experiments, which took enormous time, because
3 the system was very small and it didn't have a
4 good way of circulating the supercritical CO-2
5 through. And we had no way to measure how much
6 nicotine we got out, so we ran it for 20 or 30
7 hours. But we did bring some tobacco back,
8 enough that there was some hand-made cigarettes,
9 and I remember smoking them, and I remember I
10 couldn't tell whether they were good or not. I
11 mean, I just couldn't take a hand-made cigarette
12 and tell whether it was good or not.

13 We talked to Dr. Fassina and to his
14 boss, who is a guy named Rick Guardia, vice
15 president of research at General Foods, and they
16 said, "We'll see if we can get you some
17 experimental trials at our pilot plant at Kaffee
18 Hag in Bremen, Germany, and they did manage to do
19 that, and we visited the German facility. And
20 I'm talking now late April, early May of 1986.

21 We worked out with them and gave
22 them, you know, some suggestions of how we would
23 like it changed, because it had been used with
24 coffee beans and not tobacco.

25 We then went there with a little

Lilly

1
2 bigger bunch of people. I think we took ten or
3 twelve people, who were mostly scientists and
4 engineers, on our next visit there, which was the
5 end of May in '86. And we had a well-thought-out
6 experimental plan. We did ask the Philip Morris
7 lab in Neuchatel, Switzerland, to contribute some
8 analytical ~~help in~~ ^{people to} that effort, and one
9 processing engineer, and the Kaffee Hag people
10 contributed some of their scientists then, and in
11 particularly a lot of their technicians who ran
12 that facility.

13 We ran a bunch of experiments, as
14 many as we could fit in there. The German
15 government, since we were extracting nicotine,
16 made us work when they closed down, so when they
17 closed down at 5, we worked from 5 until 5 in the
18 morning. They required us to have a doctor on
19 hand, which we did.

20 That system, I think it was 140
21 liters, but accept that as an estimate, they used
22 in the coffee business, when they take out of the
23 green beans, they supercritically extract, they
24 had used a pressure of 3800 pounds per square
25 inch, and in circulating the supercritical fluid

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around and around, they brought it through a large carbon bed, which essentially removed everything in solution, which for the green beans was not a bad idea, because the roasting technique would bring back the flavors from roasting because they were done green.

We used the same setup on a smaller scale for the pilot plant. And in that case we were talking about 14 or 15 hours. And we found with the carbon we were essentially removing 10 to 15, 20 percent of the total material, because there was just no selectivity at all. Everything that came through came out on the carbon.

04:24:00 Q. It wasn't nicotine-specific, you mean?

A. No. In fact, the supercritical extraction is not nicotine-specific, nor is it wax-specific or even caffeine-specific. It goes after compounds that are in a certain volatility range, and you have to build the specificity into the process.

That tobacco out of that trial was absolutely terrible. I will personally testify to you that it was terrible, because I could not

Lilly

smoke it. Okay?

We knew we had to get rid of carbon, so we went back at the end of that summer, in '86, with another trial. These trials would last anywhere from four to six weeks. And there we did experiments with several things. We did experiments with cloth, we did experiments with ground-up coconut shells --

Q. This is as a receiving medium?

A. Yes. I mean we kept the thing over here the same, where we would pump CO-2 through. What we were trying to do was have a better medium that we could lower the losses out of the thing.

Finally, one of the scientists at Kaffee Hag said, you know, what you've got to do is reach some sort of equilibrium and you aren't. You're taking everything out of here, which means on the next pass through you get everything back in there. And so we began to look at things like cellulose, and plant materials. And we finally -- we looked at ground-up good tobacco, which didn't make any sense.

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We final finally determined, if we used stems that had some of the same chemistry as the tobacco we were trying to extract, that you could reach an equilibrium in which the amount that the CO-2 stream could carry in that particular compound was so that there was no net movement out of the tobacco or into the stems. It was an equilibrium.

We then were able to cut our losses in materials a lot. Then we --

Q. Let me stop you. What was happening there, that by having an equilibrium in --

A. Yes, by having a stream that's saturated in a particular compound, let's say a tobacco wax, that may also be in the stems and in the tobacco shreds, so you can take 1400 parts per million in the CO-2 stream. Once that was reached, by coming from both places --

Q. You stopped extracting it?

A. You stopped extracting it. It was an equilibrium.

That did lead -- those tobaccos coming back led to somewhat better subjectives, and immediately then the experiment turned out to

Lilly

be that we actually put citric -- potassium citrate on the stems, and there we were trying to create a sink, a place where nicotine would normally want to go, and that worked pretty well and gave us some specificity with the rest of equilibrium.

Now, these experiments were taking a long time, they were taking at the beginning of our work 16 hours, which was a very long time, because it went into the time we weren't supposed to be extracting. And we ended up with one of the engineers in the laboratory, where we had a very small, almost the size of this cup, system, saying that he had found that ammonium bicarbonate put onto the tobacco that was being extracted was able to double his rate of extraction and take it from a real long time, like 16 hours, to something that made more sense commercially.

On our next trip there, we did that, ammonium bicarbonate being interesting because half of it goes to CO-2, the bicarbonate part of it, and then you had some ammonia, which did end up partially on the stems and partially in the

Lilly

filler.

That gave us things that began to make sense commercially, because they were now six or seven hours. Use of the stems gave us, you know, losses that we were able, by being very careful, to get down below 1 percent.

And then the tobaccos, I remember very well in the trip there in January of '87, began to, at least in our minds, at least from a comparison, began to taste a lot better. Those tobaccos were either sent back or carried in suitcases. There wasn't a lot of this tobacco. Or put on planes. The stems that were used there were stored and eventually shipped back on a boat and actually run through our normal like disposal of chemical people.

And I can't give you any more details on that because I simply don't know the details of that.

Q. Why did you bring the stems back?

A. We didn't want to leave them over there. Kaffee Hag didn't know what to do with a bunch of tobacco stems. And if you know the German government, there's got to be a

Lilly

regulation, you know, for throwing away anything, so we didn't know what to do.

The final development of the process was in the May -- April-May time period, June, of 1987, and there the intent was to take blends, like Marlboro blend, you know, or other blends of burley, bright and oriental, and simply try to make more of them, so that they could be used in actual tests to make cigarettes, so that they weren't just things that had to be hand-made, they would be, for instance, 30 pounds, where you could use them on a maker.

And so the last experiment was one of just gritting our teeth and just doing kind of production that we could do on that machinery.

We left some people there to go through and clean up the system and do wipe tests and make sure we didn't leave nicotine anywhere, which we didn't, so they could go back to the coffee business.

My last trip there was at that time period. And we came back and turned the product development part of the project over to people in product development.

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That in my -- at least in my boss' mind, ended my part of being the leader of the process development.

That's as complete as I can remember.

MS. ROBBINS: And it's 4:30.

MR. MURPHY: It is now about 4:30. If you had some questions on this, I don't want to cut you off, but you indicated that you weren't going to get on to the next subject in any event.

MR. PAYTON: No, that's true. I am perfectly willing to stop now. I mean, that's what we agreed.

THE VIDEO OPERATOR: The deposition of A. Cliff Lilly will adjourn at 4:32:17 on Videotape Number 3 for June 30, 1995.

(Time noted: 4:32 p.m.)

Arnys Clifton Lilly, Jr.
ARNYS CLIFTON LILLY, JR.

Subscribed and sworn to before me
this 26 day of April, 1995.

William O. Maddey
My commission expires 10/31/98
MANHATTAN REPORTING CORP.

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C E R T I F I C A T E

STATE OF NEW YORK)

: ss.

COUNTY OF NEW YORK)

I, JACK FINZ, a Certified Shorthand
Reporter and Notary Public within and for the
State of New York, do hereby certify:

That ARNYS CLIFTON LILLY, JR., the
witness whose deposition is hereinbefore set
forth, was duly sworn by me and that such
deposition is a true record of the testimony
given by the witness.

I further certify that I am not
related to any of the parties to this action by
blood or marriage, and that I am in no way
interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto
set my hand this 5th day of July, 1995.


JACK FINZ, C.S.R.

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E X H I B I T S

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(Lilly Exhibit 7 for identification, inter-office correspondence to W.L. Dunn from F.J. Ryan, dated August 16, 1974.).....	137	19
(Lilly Exhibit 8 for identification, document entitled "Smoking and Health Program, Status Report, December 1978.").....	152	2
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